

Kansas Department of Health and Environment (KDHE) Significance of Inorganic Water Analysis for Human Usage

Total Hardness

Calcium and magnesium are the principal minerals contributing to total hardness. Hard water has a tendency to develop scale deposits, especially when heated above 140° F. Soft water may be corrosive. A total hardness of 400 mg/l is considered excessive in Kansas.

Sodium

Because high sodium level can adversely affect those persons on a restricted sodium diet, people need to be aware of the sodium level in their drinking water, especially if the sodium value is greater than 100 mg/l. Water softeners which are recharged with salt further increase the sodium level.

Potassium

The concentration of potassium normally found in drinking water has no physiological or aesthetic effects on drinking water users.

Alkalinity, pH and Langerlier's Index

The alkalinity of water is a measure of its capacity to neutralize acids. Bicarbonate and carbonate are the major contributors to alkalinity. The pH value of a solution indicates the intensity of the acidic or basic character of the solution. The pH scale extends from 0, very acidic, to 14, very alkaline, with 7 being neutral. The relationship of pH, calcium and alkalinity determines whether water is corrosive or whether it will deposit calcium carbonate. Langerlier's Index (LI) is an indicator of the corrosivity of water. KDHE interprets a water as being highly aggressive if the LI is less than -2.0, moderately aggressive if between -2.0 and 0, and nonaggressive if greater than 0.

Chloride

The suggested limit for chloride is 250 mg/l because some people can detect a salty taste when chloride exceeds 250 mg/l. Chloride has no physiological effect.

Sulfate

The suggested limit for sulfate is 250 mg/l because of the bitter taste and laxative effects of sulfate above that level. Sulfate can act as a laxative to sensitive persons not accustomed to high sulfate water.

Nitrate

The drinking water standard for nitrate, reported as nitrogen (N), is 10 mg/l. Excessive nitrate may result in infant cyanosis, also known as methemoglobinemia or "blue baby syndrome", in children less than one year of age. There are no significant health risks for older children or adults. Boiling water will not remove nitrate.

Fluoride

The maximum contaminant level (MCL) for fluoride is 4.0 mg/l with a suggested limit of 2.0 mg/l. A fluoride concentration of approximately 1.0 mg/l helps prevent dental cavities. At concentrations below 0.7 g/l, fluoride will not be of any benefit. At concentrations above 2.0 mg/l, fluoride may cause mottling of the teeth.

Turbidity

Turbidity in water is the suspended material which causes a beam of light to scatter. Turbidity can be significant aesthetically and physiologically because it can provide a support for bacteria. The limits for surface water is a maximum two-day average of 5 NTU and a maximum average of 1 NTU over a thirty-day period. No limits are established for ground water.

Specific Conductance

Conductance is a numerical expression of the ability of water to conduct an electric current. Because the number, which is expressed as micromhos per centimeter, depends on the concentration of the dissolved minerals, conductance indicates the degree of mineralization in water. A conductance greater than 1,500 umoh/cm is considered excessive.

Total Dissolved Solids

TDS is a measure of the dissolved material in water. EPA suggests a TDS over 500 mg/l is objectionable because of the mineral taste and the possible physiological effects.

Total Phosphorus

Phosphate is a nutrient found in water. In raw surface water, phosphate may cause water treatment problems associated with aquatic plants and with coagulation. Phosphate is used occasionally in an effort to keep iron and manganese in solution.

Silica

Silica has no physiological significance to humans, but can cause crusting deposits on well screens, pipes and water heaters. Concentration above 50 mg/l may cause a cloudy appearance.

Ammonia

Ammonia can occur naturally in water supplies, while some water treatment plants add ammonia to react with chlorine to form a combined chlorine residual to control formation of trihalomethanes. At concentrations normally found it has no health effect, but may cause unpleasant odors.

Iron and Manganese

Iron and manganese are objectionable because of the bad taste associated with the water, the staining of plumbing fixtures and laundered clothes, and the probable deposition of the elements in the distribution system. They have no significance physiologically. The suggested limits for iron and manganese are 0.3 mg/l and 0.05 mg/l respectively.

Heavy Metals

For physiological effects the present standards for heavy metals and cyanide are:

Compound	MCL
Arsenic	0.05 mg/l
Antimony	0.003 mg/l
Barium	2.00 mg/l
Beryllium	0.004 mg/l
Cadmium	0.005 mg/l
Chromium	0.1 mg/l
Cyanide	0.2 mg/l
Lead	0.015 mg/l
Mercury	0.002 mg/l
Nickel	0.1 mg/l
Selenium	0.05 mg/l
Thallium	0.002 mg/l

The suggested limits for copper and zinc are 1.3 mg/l and 5.0 mg/l respectively. The presence of copper and zinc indicates a possible corrosion problem.